

Appl. No.: 10/559,944
Amdt. dated February 23, 2010
Reply to Office Action of November 25, 2009

Docket No.: MAC.10865

AMENDMENTS TO THE DRAWINGS

The attached Replacement Sheets, which include Figures 1-10, replace the original sheets including Figures 1-10. The Replacement Sheets include changes to Figures 1-4, 5, 9, and 10. In Figures 1-4 the text “Related Art” is added, and, in Figures 5, 9, and 10 the reference character 310 is added. No new matter is added.

Attachment: Replacement Sheets

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REMARKS

Claims 1-3 and 5-29 are pending in this application, claims 7, 16, 17, and 23-29 having been withdrawn by the Examiner. By this Amendment, Figures 1-5, 9, and 10 are amended. No new matter is added. Applicants request reconsideration of the application based on the following remarks.

Objection to the Drawings

The Office Action objects to the drawings under 37 CFR 1.83(a) for allegedly failing to show every feature of the invention as recited in the claims (see Office Action, page 2). Specifically, the Office Action asserts that the drawings allegedly fail to label Figures 1-4 as prior art, fail to show the reference character 310, and fail to show the radical generation means and the plasma excitation means, recited in claims 21 and 22, respectively (see Office Action, page 2). By this Amendment, Applicants amend the drawings to include the appropriate label in Figures 1-4 and the reference character 310 in Figures 5, 9, and 10. However, Applicants respectfully submit that the drawings currently show the radical generation means and the plasma excitation means recited in the claims. No new matter is added.

Applicants' specification details the deficiencies of plasma generators in the prior art (see Specification, paragraphs [16]-[18]). Specifically, Applicants describe that RF power is used to excite plasma in a reaction gas, which is then introduced to a substrate. However, the speed of the reaction gas reaching the substrate is not coincident with the electrical transmission speed of the RF power. Thus, the RF power must be repeatedly turned ON/OFF and applied at a determined step only. This causes the RF generator for generating the RF power and the RF matching network for stabilizing plasma to have a shortened service life. In addition, for each substrate, new reaction gas is introduced into the reaction chamber. However, previous reaction gases are not always completely removed from the reaction chamber and thus impurities are introduced.

Applicants' specification also details the deficiencies of radical generators in the prior art (see Specification, paragraphs [19]-[20]). Specifically, Applicants describe that, in the prior art, a reaction gas is radicalized in a radical generator prior to the reaction gas being inserted within a reaction furnace. However, such an operation results in the internal pressure of the reaction furnace becoming unstable, in addition to the problems with durability associated with valve switching and time delay.

Applicants solve the aforementioned problems by providing structure that performs plasma excitation and radicalization on reaction gases that are continuously supplied, and thus the operating time points do not need to be controlled (see Specification, paragraphs [28] and [77]). Therefore, a high quality thin film can be formed under stable processing conditions (see Specification, paragraph [28]).

To support the above-mentioned solutions, Applicants describe the corresponding structure of the present invention that achieves these solutions. Specifically, Applicants describe that the RF power application device is connected through the rotation shaft 320 with an electrical conductive member, which is attached to the bottom face of the upper plate 512, which corresponds to the top of a substrate in the reaction cell 510 (see Specification, paragraph [79]). Accordingly, "the gas inside of a certain specific reaction cell 510 connected with the RF power application device remains in plasma-excited state, and, dissimilar to the conventional apparatuses, it is not necessary that plasma is excited every time when a specific gas is supplied" (see Specification, paragraph [79]). In addition, Applicants describe that one reaction gas among the gases supplied from the gas supply means 300 is radicalized, and through the structure described within the specification, the radicalized reaction gas is continuously supplied to the inside of the particular reaction cell 510 (see Specification, paragraph [82]). Consequently, Applicants' specification and corresponding Figures, describe the structural features responsible for the operation of the claimed invention that achieves the claimed plasma excitation means and radical generation means.

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As a result, Applicants believe that every feature of the invention recited in the claims is shown in the drawings and respectfully request that the Examiner withdraw the objection to the drawings.

Rejections under 35 U.S.C. §102

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The Office Action rejects claims 1, 3, 5, 8, 11-13, 15, and 21 under 35 U.S.C. § 102(b) as being anticipated by KR 10-2003-0086056 to Shim et al. (hereinafter “Shim”).¹ Applicants respectfully traverse this rejection and request reconsideration of the claims for at least the following reasons.

Shim does not disclose each and every feature recited in independent claim 1. Specifically, Shim does not disclose “a gas supply means for supplying a plurality of gases to the inside of the reaction chamber from the outside, the gases including a reaction gas,” as recited in independent claim 1 (emphasis added).

The Office Action asserts that Shim discloses a gas supply part 100 (see Shim, Fig. 3) and members 131-134 (see Shim, Figs. 5-7) that allegedly correspond to the above-recited features (see Office Action, pages 3 and 4). Applicants disagree with this assertion for at least the following reasons.

¹ Applicants note that the first-named inventor of KR 10-2003-0086056 is not “Shim,” but is in fact Cho, Byeong Ha. In addition, Applicants note that “Shim” is not listed on KR 10-2003-0086056 as an inventor. Nevertheless, for convenience and conformity with the Office Action, Applicants will refer to KR 10-2003-0086056 hereinafter as “Shim.”

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Shim suffers from some of the same maladies as the prior art described within the specification. Specifically, Shim suffers from the amount of time required for an appropriate amount of a reaction gas and an inert gas to reach the substrate. For example, Shim discloses that gas supply part 100 is located at the upper portion of a rotary disc part 170 and supplies gas into a reaction chamber (see Shim, Abstract). However, Shim's gas supply part 100 does not supply a plurality of gases, including a reaction gas, to the inside of the reaction chamber, because the reaction gas jet parts and the inert gas jet parts comprising the stick-type members 131-134 that form the injection grooves are alternately installed at the gas supply part 100 (see Shim, Abstract). Indeed, once one of the reaction gas injector or the inert gas injector is alternately installed in place of the other, the corresponding reaction or inert gas, as the case may be, but not both, is directly injected on the surface of the wafer. Subsequently, the other of the reaction gas or inert gas injector is installed and the corresponding gas is injected. Consequently, Shim does not disclose "a gas supply means for supplying a plurality of gases to the inside of the reaction chamber from the outside, the gases including a reaction gas," as recited in independent claim 1 (emphasis added).

For at least the foregoing reasons, Applicants respectfully request that the anticipation rejection of independent claim 1 be withdrawn. Also, claims 3, 5, 8, 11-13, 15, and 21 depend from claim 1. Accordingly, Applicants respectfully request that the anticipation rejection of these claims also be withdrawn, at least based on their respective dependence on claim 1, as well as for the additional features that each of these claims recites.

Rejections under 35 U.S.C. §103(a)

To establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or suggest

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all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based upon the Applicants' disclosure. A failure to meet any one of these criteria is a failure to establish a *prima facie* case of obviousness. See MPEP §2143.

The Office Action rejects claim 2 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of U.S. Patent No. 6,634,314 to Hwang et al. (hereinafter "Hwang"); rejects claim 6 under 35 U.S.C. §103(a) as being unpatentable over Shim; rejects claim 9 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of U.S. Patent No. 6,132,512 to Horie et al. (hereinafter "Horie"); rejects claim 10 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Horie, and further in view of U.S. Patent No. 6,929,830 to Tei et al. (hereinafter "Tei"); rejects claim 10 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Horie, and further in view of U.S. Patent Application Publication No. 2006/0000412 to Ahn et al. (hereinafter "Ahn"); rejects claim 14 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of U.S. Patent Application Publication No. 2005/0017100 to Watanabe et al. (hereinafter "Watanabe"); rejects claim 18 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of U.S. Patent No. 5,884,009 to Okase; rejects claim 18 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of U.S. Patent No. 5,223,001 to Saeki et al. (hereinafter "Saeki"); rejects claim 18 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of U.S. Patent No. 6,183,564 to Reynolds; rejects claim 19 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Okase, and further in view of U.S. Patent No. 6,821,563 to Yudovsky; rejects claim 19 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Saeki, and further in view of Yudovsky; rejects claim 19 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Reynolds, and further in view of Yudovsky; rejects claim 19 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Reynolds, and further in view of U.S. Patent No. 5,281,274 to Yoder; rejects claim 20 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Okase and Yudovsky, and further in

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view of U.S. Patent No. 6,156,151 to Komino et al. (hereinafter “Komino”) and U.S. Patent Application Publication No. 2005/0167052 to Ishihara et al. (hereinafter “Ishihara”); rejects claim 20 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Saeki and Yudovsky, and further in view of Ishihara; rejects claim 20 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Reynolds and Yudovsky, and further in view of Ishihara; rejects claim 20 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Reynolds and Yoder, and further in view of Ishihara; and rejects claim 22 under 35 U.S.C. §103(a) as being unpatentable over Shim in view of Japanese Patent No. 2002-324760 to Toyoda et al. (hereinafter “Toyoda”). Applicants respectfully traverse these rejections and request reconsideration of the claims for at least the following reasons.

For the reasons discussed above with regard to independent claim 1, Applicants respectfully submit that independent claim 1 is patentable over the applied references, in any combination. Claims 2, 6, 9, 10, 14, 18-20, and 22 depend from claim 1. Accordingly, Applicants respectfully request that the rejections of these claims be withdrawn, at least based on their respective dependence on claim 1, as well as for the additional features that each of these claims recites.

Regarding Doctrine of Equivalents

Applicants hereby declare that any amendments herein that are not specifically made for the purpose of patentability are made for other purposes, such as clarification, and that no such changes shall be construed as limiting the scope of the claims or the application of the Doctrine of Equivalents.

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CONCLUSION

Applicants respectfully requests that a timely Notice of Allowance be issued in this case.

If any fees, including extension of time fees or additional claims fees, are due as a result of this response, please charge Deposit Account No. 19-0513. This authorization is intended to act as a constructive petition for an extension of time, should an extension of time be needed as a result of this response. The Examiner is invited to telephone the undersigned if this would in any way advance the prosecution of this case.

Respectfully submitted,

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Appendix